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I. Summary

This series product is a stable and battery-driven 3 1/2 digital multimeter with high reliability. It adopts LCD screen with character height of 28mm; with functions including unit sign/backlight and overload protection, it is easy to use.

This series of device can be used to measure DCV, ACV, DC, AC, resistance, capacitance, inductance, diode, triode, open circuit, temperature and frequency, as well as hold peak value. As an instrument with excellent performance it adopts double integral A/D converter as its core.

II. For purchasers of this multimeter

1. Safety notice

This series of device is designed according to IEC1010 standard (safety standard issued by International Electrotechnical Committee). Please read these safety notices before using it.

1-1. Never input DC higher than 1000V or AC higher than 750V virtual voltage as measuring voltage;

1-2. The voltage lower than 36V is safe. Please confirm the earthing, connection and isolation of pencils to avoid electric shock when measuring the voltage of DC higher than 36V or AC higher than 25V;

1-3. Pencils should be away from test points when switching function or range;

1-4. Select correct function and range and beware of miss-operation. You may still be careful to ensure the safety even the device has range protection functions.

1-5. Never input current higher than 20A when measuring current;

1-6. Introduction for safety sign

"⚠" Dangerous voltage existing; "⏚" Earthing; "⧈" Double isolation; "⚠" Shall refer to the user's manual; "🪫" Low battery.

III. Unpacking inspection

Open the package to check if all parts and accessories are all right in the box

1. Multimeter 1
2. Battery (9V) 1
3. Leather case 1
4. Vibration proof sheath 1
5. Acceptance certificate 1
6. Crocodile clip 1 pair
7. Temperature probe (banana type) 1 pair
8. Testing accessory 1
9. Pencil (20A) 1 pair
10. User's manual 1

IV. Features

1. General features

1-1. Display mode: LCD;

1-2. Max display: 1999 (3 1/2) digits automatic polarity display;

1-3. Measurement method: double integral A/D conversion;

1-4. Sampling rate: about 3 time per second;

1-5. Over-range display: the highest digit displays "OL" or "-OL"

1-6. Low voltage display："🪫";

1-7. Working environment: (0～40)℃, relative humidity: <80%;

1-8. Power supply: one 9V battery (6F22 or equivalent model);

1-9. Dimension: 189mm * 97mm * 35mm (length*width*height);

1-10. Weight: about 400g (including 9V battery);

2. Technical features

2-1. Accuracy: ±(a% × reading data + character number), ensure in accuracy environment temperature:

(23±5)℃, relative humidity <75%, and the calibration warranty period lasts for one year from the date of leaving the factory.

2-2. Performance (▲ indicates the function is available for this model)

Model / Function	VICTOR 88C
DCV	▲
ACV	▲
DCA	▲
ACA	▲
Resistance Ω	▲
Diode/ Open circuit	▲
Triode hFE	▲
Capacitance C	▲
Temperature ℃	▲
Frequency f	▲
Inductance L	▲
Auto power off	▲
Backlight	▲
Peak value holding	▲

2-3. Technical index

2-3-1. DCV

Range	Accuracy	Resolution
200mV	±(0.5%+3)	100uV
2V		1mV
20V		10mV
200V		100mV
1000V	±(1.0%+5)	1V

Input impedance: All range is10MΩ;

Over load protection: 250V DC or 205 V AC peak value for range 200mV; 1000V DC or 1000V AC peak value for other.

2-3-2. ACV

Range	Accuracy	Resolution
200mV	±(1.2%+3)	100uV
2V	±(0.8%+5)	1mV
20V		10mV
200V		100mV
750V	750V	1V

Input impedance: All range is10MΩ;

Over load protection: 250V DC or 205 V AC peak value for range 200mV; 1000V DC or 1000V AC peak value for other.

Frequency response: 40~400Hz for range under 200V; 40~100Hz for range 750V;

Display: Sine wave virtual value (AVG value response).

2-3-3. DCA

Range	Accuracy	Resolution
2mA	±(0.8%+3)	1uA
20mA		10uA
200mA	±(1.2%+4)	100uA
20A	±(2.0%+5)	10mA

MAX measurement voltage drop: 200mV;

Max input current: 20A (no more than 10 seconds);

Over load protection: 0.2A / 250V self-healing fuse for ranges under 200mA, 12A / 250V quick acting fuse for range 20A.

2-3-4. ACA

Range	Accuracy	Resolution
2mA	±(1.0%+5)	1uA
20mA		10uA
200mA	±(2.0%+5)	100uA
20A	±(3.0%+10)	10mA

MAX measurement voltage drop: 200mV;

Max input current: 20A (no more than 10 seconds);

Over load protection: 0.2A / 250V self-healing fuse for ranges under 200mA, 12A / 250V quick acting fuse for range 20A.

Frequency response: 40~200Hz;

Display: Sine wave virtual value (AVG value response).

2-3-5. Resistance (Ω)

Range	Accuracy	Resolution
200Ω	±(0.8%+5)	0.1Ω
2kΩ	±(0.8%+3)	1Ω
20kΩ		10Ω
200kΩ		100Ω
2MΩ		1kΩ
20MΩ	±(1.0%+15)	10kΩ
2000MΩ	±[5%(读数 –10)+ 20]	1MΩ

Open circuit voltage: lower than 3V;

Over load protection: 250V DC or AC peak value;

Caution: a) If in range 200Ω, please short pencils and measure lead resistance, and then subtract the resistance from the value measured.

b) It is normal to show 10MΩ when pencils shorted in range 2000MΩ, it will not effect the accuracy and shall be subtracted from the value measured. For example: The object resistance is 1000MΩ, the reading value is 1010MΩ, then the correct value shall be 1010 – 10 = 1000MΩ.

c) Lagged showing of value is normal when measuring resistance higher than 1MΩ. Please wait until the display is stable.

2-3-6. Capacitance (C)

Range	Accuracy	Resolution
20nF	±(2.5%+20)	10pF
200nF		100pF
2uF		1nF
20uF		10nF
200uF	±(5.0%+5)	100nF

Testing frequency: 100Hz;

Over load protection: 36V DC or AC peak value;

2-3-7. Inductance (L)

Range	Accuracy	Resolution
2mH	±(2.5%+20)	1uH
20mH		10uH
200mH		100uH
2H		1mH
20H		10mH

Testing frequency: 100Hz;

Over load protection: 36V DC or AC peak value;

2-3-8. Temperature (℃)

Range	Accuracy	Resolution
(-20 ~ 1000)℃	±(1.0%+4) < 400℃ ±(1.5%+15) ≥ 400℃	1℃

Thermocouple (plug of banana type).

2-3-9. Frequency (f)

Range	Accuracy	Resolution
2kHz	±(0.5%+4)	1Hz
20kHz		10Hz
200kHz		100Hz
2000kHz		1KHz
10MHz		10KHz

Input sensitivity: higher than 3.5V V_{P-P};

Over load protection: 250V DC or AC peak value(less than 10 seconds);

2-3-10. Diode and open circuit test

Range	Value displayed	Test condition
	Diode forward voltage drop (Unit: mV)	Forward DC: about 1mA, reverse voltage: about 3V.
	Buzzer sounds continuously, resistance between two test points is less than 70Ω±20Ω.	Open circuit voltage is about 3V.

Over load protection: 250V DC or AC peak value;

Warning: Never input voltage in this range.

2-3-11 Measuring triode's hFE parameter

Range	Display range	Test condition
hFE, NPN or PNP	0 ~ 1000	base electrode current is about 10uA, and Vce is about 3V

V. Operation method

5-1. Operation panel introduction

1. LCD: display the measured value and the unit;

2. Function keys

2-1. Power switch: turn on /turn off power;

2-2. PK HOLD: Pressing this key will hold all max value measured in the screen showing sign "PH"; press again, "PH" will disappear and exit the status of peak value holding.

2-3. B/L switch to enable backlight which will be turned off auto after about 5 seconds.

2-4. DC/AC: select DC/AC working mode.

3. Rotary switch: to change measurement function and range;

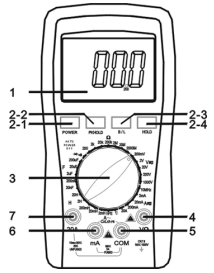
4. Jack for measurement of voltage, resistance and frequency;

5. Common ground: positive input for capacitance (Cx), inductance (Lx), triode and temperature.

6. Positive jack for current lower than 200mA; negative input for capacitance (Cx), inductance (Lx), triode and temperature.

7. Jack for current 20A.

Please refer to the figure:



5-2. Voltage measurement

1. Insert the black pencil into the "COM" jack, and the red one into the "V/Ω/Hz" jack;

2. Turn the switch to position "V". If the level of voltage to be measured is unknown then select the biggest range and then decrease the range step by step until getting the value with the highest resolution.

3. Popup the key "DC/AC" to enter into DC mode if measuring DC; Press down the key "DC/AC" to set into AC mode.

4. The screen will show the voltage measured if touch the testing point using the pencils; the point touched by the red pencil is in positive voltage if the value showed is positive.

Notice:

1. As showed, “OL” indicates the range is over and shall switch to a higher range.

2. The voltage to be tested shall not over DC 1000V or AC 750V. The pencils shall be away from the testing point as switching functions or ranges.

3. When measuring high voltage circuit, any parts of your body should not touch the high voltage circuit, otherwise it may hurt your body.

5-3. Current measurement

1. Insert the black pencil into the “COM” jack, and the red one into the “mA” or “20A” jack.

2. Turn the switch to position “A”. If the level of current to be measured is unknown then select the biggest range and then decrease the range step by step until getting the value with the highest resolution.

3. Popup the key “DC/AC” to enter into DC mode if measuring DC; press down the key “DC/AC” to set into AC mode.

4. The screen will show the value of current measured if connect in parallel the pencil to the circuit to be tested; the point touched by the red pencil is in positive voltage if the value showed is positive.

Notice:

1. As showed, “OL” indicates the range is over and shall switch to a higher range.

2. The input in “mA” jack shall not over 200mA and “20A” not over 20A (less than 10 seconds of testing duration) as measuring current; the pencils shall be away from testing points as switching function or range.

5-4 Resistance measurement

1. Insert the black pencil into the “COM” jack, and the red one into the “V/Ω/Hz” jack;
2. Turn the range switch to resistance position, then bride two pencils at the two ends of the resistor.

Notice:

1. "OL” will be displayed in screen if the resistance is over the range, then you shall increase the range by one step;
2. When input is open circuit, it will display status of overload;
3. When measuring resistance on line, ensure that all power of circuit tested are turn down and all capacitor are discharged completely;
4. Never input voltage if in resistance measurement mode!
5. It normal for resistance higher than 1MΩ that the reading data is not stable for the first several seconds;

5-5 Capacitance measurement

1. Switch to a proper range, and insert pencils into “mA” and “com” jack.
2. Connect the two pencils in parallel to the two ends of the capacitor. Please pay attention to the polarity, as the “com” for positive and “mA” for negative.

Notice:

1. If capacitance exceeds the range selected, “OL” will be displayed in screen，then you shall increase the range by one step.
2. The LCD may show some rudimental digits upon the starting of capacitance measurement. It’s normal and will not affect the testing result;
3. If there is serious creepage or capacitor broken down in high capacitance range, the digits showed will be random and unstable.
4. Please discharge capacitor completely to avoid device damage before measuring capacitance.

5-6. Inductance measurement

1. Switch to a proper range, and insert pencils into “mA” and “com” jack.
2. Bridge the pencils on the two ends of inductor.

Notice:

1. If inductance exceeds the range selected, “OL” will be displayed in screen，then you shall increase the range by one step.
2. The inductance value measured for identical inductor may be different if there is different impendence;
3. If in range 2mH, please short pencils and measure lead inductance, and then subtract the inductance from the value measured.
4. Avoid measuring small inductor in high range, or the accuracy is not guaranteed.

5-7. Temperature measurement

Turn range switch to “℃”, insert the cathode(black pin) of cold end (free end) of thermocouple into “mA” jack, anode (red pin) into “COM” jack, put the working end (temperature measurement end) of thermocouple on the surface or inside the object to be tested. Then you can read temperature from the screen, and the data is in centigrade.

Notice:

1. As the input end is open, it will show environment temperature if the operation temperature is higher than **18**℃, or normal temperature if lower than **18**℃.
2. **Please never replace temperature sensor, or the accuracy is not guaranteed;**
3. **Never input voltage if in temperature mode.**

5-8. Frequency measurement

1. Insert pencils or shielded cable into “COM” and “V/Ω/Hz“ jack;
2. Turn range switch to frequency position and bridge pencils or cables over the signal source or load tested.

Notice:

1. The device can still work if the input is higher than 10V virtual value, but the accuracy is not guaranteed;
2. In noise environment, you'd better use shield cable to measure small signal;
3. When measuring high voltage circuit, any parts of your body should not touch the high voltage circuit, otherwise it may hurt your body.
4. Never input voltage higher than 250V DC or AC peak value, otherwise it may damage your device.

5-9. Triode hFE

1. Turn the range switch to “hFE” position;
2. Insert testing accessory into “mA” and “com” jack. Please pay attention to the polarity, as the “com” for positive and “mA” for negative.
3. To determine the triode's type, NPN or PNP, insert the emitting, base and collector electrode into the corresponding jacks in testing accessory.

5-10. Diode and open circuit test

1. Insert the black pencil into “COM“ jack, and the red one into the “V/Ω/Hz“ jack (Notice: the red pencil is anode);
2. Turn the range switch to position “ ”, connect pencils in parallel to the diode tested, with the red pencil to the anode and the black to cathode, then the reading value will be approximate forward voltage drop of the diode;
3. Connect pencils to two points of the circuit to be tested, if buzzer sounds, then the resistance between the two points is lower than (70±20)Ω.

5-11. Peak value holding

Press HOLD, the peak value of current data will be keep displaying in screen; press again to cancel this function.

5-12. Auto power off

After about (20±10)minutes device not being used, it will be powered off automatically and enter into dormant status, and press “POWER” again for two times to turn on power.

5-13. Backlight

Press “B/L” key to turn on backlight. After 20 seconds, the backlight will be turn down automatically.

Notice:

When backlight is bright, working current becomes higher, and it will short the service life of battery and the error for some other functions will increase.

VI. Device maintenance

This series of device is a kind of precise instrument; please do not change the internal circuit by your self.

6-1. Pay attention to the waterproof, dustproof and breakproof of the device;

6-2. Please do not store or use it in environment of high temperature, high humidity, high flammability or strong magnetic.

6-3. Please clear the device using wet cloth and soft detergent, and abrasive and drastic solvent such as alcohol are forbidden.

6-4. Please take out battery to prevent device from being eroded by battery weeping if the device will not be used for a long time;

5-4-1. Be care of the status of batteries. When sign “ ” is showed in screen, please replace batteries.

6-4-1-1. Remove vibration proof sheath, screw out nut that fixing battery lid, and remove battery cap;

6-4-1-2. Take off 9V batteries, replace with new one. It is recommended to use alkaline battery for long time of operation; even any 9V battery is adoptable.

6-4-1-3. Close the battery cap and tighten the screws.(refer to Figure 2)

6-4-1-4. Take on vibration proof sheath.

6-4-2. Replacing fuse

Please replace fuse with an identical one if necessary.

VII. Trouble shooting

If you device can not work normally, the methods bellow may help you to solve general problems. If these methods do not work, please contact service center or dealer.

Fault symptom	**Inspection area and method**
No display	■ Power is not on ■ Holding switch; ■ Replacing battery
sign appears	■ Replacing battery
No current input	■ Replacing fuse
Too great error displayed	■ Replacing battery

We will not give a further notice for any change of this manual.

We have tried our best to confirm the correction of this manual's content. If you find any mistake or omit, please contact us.

We will not be responsible for any accidents or damages caused by miss-operation.

Functions described in this book can not be used as reason for special purpose.